The Lies of Unleaded Petrol

Oil companies convinced us that unleaded petrol is safer for our health and environment than leaded petrol.
By their failure to disclose all the facts, we have been seriously conned!

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The very terms "leaded" and "unleaded" are misleading. They give the impression that "leaded" petrol is contaminated with something nasty, namely lead, while "unleaded" is somehow pristine, pure. Whilst it is true that "leaded" petrol contains lead, and lead is not a nice substance to have spewing out of the exhaust pipes of millions of cars, the truth is that unleaded petrol has even nastier properties. Let's start at the beginning.

When internal combustion engines were first developed for the automobile, they ran on a substance known as "motor spirit". By today's standards, motor spirit was an exceptionally "clean" fuel; properly burnt in an efficient engine, the main exhaust products were water vapour, carbon dioxide and some trace carbonic elements and particles. There were two main problems with motor spirit. First and foremost, it was a highly refined product which cost the oil companies far more to produce than what they wanted to spend, or what they thought they could charge if the automobile was really to take off in a big way. Secondly, the original combustion engines ran at very low compression ratios compared to today. As the vehicle manufacturers strove to produce ever faster, more powerful engines, they gradually raised the compression ratios, as this is one of the easiest ways of gaining more power from any given-sized power plant.

So, for a period, these two problems developed side by side until they eventually collided with the development of the V-8 engine. On the one hand, fuels were becoming less and less refined, and therefore more contaminated with products that adversely affected engine efficiency. On the other hand, power plants were being developed which employed ever higher compression

ratios and required ever more exacting performance from the fuel used. With the advent of the high-compression engine, a point was reached where cars would not run satisfactorily on the product being supplied by the oil companies. An engine under load would develop a condition known as "pinging", where the fuel mixture would explode due to compression before the right time, causing rough running, stalling going up hills, and so on.

There was only a shortlist of answers. Vehicle manufacturers could go back to designing low-compression engines, the oil companies could go back to producing a highly refined product, or something would have to be found that could be added to stop the fuel pre-igniting. The first choice was unacceptable to the manufacturers. They had long since embarked on a marketing strategy that demanded ever bigger, ever more powerful power plants every year. Nobody was prepared to take the risk of producing a less-efficient, less powerful engine than the one offered the year before. The second choice was unacceptable to the oil companies. They had perfected the technique of producing a fuel with a minimum of refining, that could still be burned in engines, at such a low price and in such quantities that they were well on their way to becoming the richest, most powerful companies on Earth. They had no intention of greatly increasing the cost of their product, thereby turning many people off the "advantages" and "economy" of owning their very own car.

The third choice was the only acceptable one. All that was needed was to find some product, something that could be obtained cheaply, that could be added to petrol to reduce its tendency to "ping" under compression. Common lead was found to have all the right properties, and so "leaded" petrol was born.

By the late 'sixties, supplies of high-grade, low-sulphur, low-nitrate oil were becoming scarce enough to command premium prices. This type of oil was favoured by the petroleum producers, since removing these contaminants to an acceptable level is difficult and costly. The companies were refining increasing amounts of the cheaper, high-sulphur, high-nitrate oil, but using the same old processes. This in turn led to ever higher levels of sulphur dioxide and nitrogen oxide in vehicle emissions, and people were starting to complain-if not about the environmental effect, then at least about the smell. The smog banks over the bigger American and Australian cities during this period were not, as most people believe, the result of so many more cars on the road, although this, of course, was a contributing factor. The main cause was the vastly increased levels of sulphur/nitrogen oxides in the vehicle emissions because of the higher levels of contamination in the fuels themselves. The oil companies were once again faced with the dilemma of cleaning up their product or finding another solution that did not affect their profits. The chemical theories and practices of catalytic conversion had been known for many years.

It had always been known to the oil companies that they could use these processes to further refine their petroleum products. This, however, would have

meant major upgradings of their refineries. Far better if they could get somebody else to foot the bill. Even better if they could get somebody to meet the cost of total responsibility for all the oxides.

In the 'fifties, a lot of work was done trying to utilise the CO_2 from such fixtures as coal and oil electric power stations to increase plant growth. These efforts failed because of the harmful effects of the concentrations of other pollutants in the exhausts. These were principally the same sulphur/nitrogen oxides. At the time of these experiments, it was discovered that passing the exhaust gases through a filter of platinum caused a catalytic conversion of the oxides to other products which could then be prevented from escaping into the greenhouses used for food production. The problem at the time was that it was not economically feasible to do this: platinum converters are very expensive things, and they do eventually wear out and require replacing. There was an added problem that the eventual by-products were in many cases even more harmful than the original oxides. This information then remained unused for some decades.

THE BIG CON

Eventually the blankets of sulphur and nitrogen oxides, better known as smog, grew so thick and so unbearable that "public opinion" caused America's legislators to start looking for answers. Obviously the place to start was with the oil companies. The oil companies announced quite loudly, and mostly erroneously, that the problem was "so many cars".

There were only two solutions, they said: either limit the number of cars, or put something into the cars to "change" and limit the emissions. Was such a thing possible, asked the legislators? Certainly, replied the oil companies. Let us tell you about "catalytic converters" which can be fitted to the exhaust system of every car.

The legislators, although they toyed with the concept, were not about to try and seriously interfere with people's rights to drive motor cars. Such action was perceived as electoral suicide, especially when there was the alternative "magic bullet" solution of converters available. Neither were they about to listen to all the "extremists" who were trying to tell them that the problem was in the type of oil being refined in the first place, and the only long-term solution was to get the oil companies to clean up their act. Such people contribute very little to election campaigns; the petrol chemical giants contribute millions. There was only one problem left for the oil companies. Unfortunately, while platinum doesn't react to any great degree with the products of burnt petrol, it reacts very readily with lead-so readily, in fact, that burning a single tankful of "leaded" petrol in a car with a catalytic converter will render the converter useless. (This is the reason it is illegal to put "leaded" petrol in the fuel tank of a car designed

to run on the "unleaded" variety.)

Trouble was, the oil companies couldn't simply stop putting lead in petrol, because the original reason for its presence-to stop "pinging"-still existed. There were available alternative additives that could be used, but these all had the disadvantage that, untreated, they produced emissions far more deadly than even the lead. On the plus side, however, these emissions could be filtered out by catalytic converters. What was needed, then, was a campaign to convince people that "leaded" petrol was a grave danger to the environment, and that the only solution was to cease using it, replace it with the "unleaded" variety, and then run the emissions through a catalytic converter. Such a campaign would ensure that legislation was passed forcing the fitting of catalytic converters, which would overcome the original problem for the oil companies-the increased levels of sulphur and nitrates in their fuel. You see, the campaign never had anything to do with lead: it was simply a matter of convincing people to use a fuel that wouldn't wreck the converters, so that the petroleum companies didn't have to spend any more money refining the oil and could get away with selling a dirtier product, forcing the motorist to bear both the responsibility and the cost of trying to clean up the air.

Anybody who doubts it was the quality of the petrol rather than the number of cars which caused the massive increase in smog in the period in question, need only look to actual figures. While it is true that the number of cars in use was increasing, the rate of increase was fairly steady. At the height of the "smog wars", however, the levels of emissions were increasing at nearly four times the rate of growth of car ownership. On top of that, this was the period where petrol was starting to get more expensive, and "economical" engines were becoming the order of the day. That is, although both car ownership and petrol consumption were on the increase, rate of ownership far outstripped rate of increase of consumption.

(Source: Peter Sawyer, Green Hoax Effect, Groupacumen Publishing, Wodonga, Victoria, Australia, 1990)

- HEALTH RISKS FROM ULP! -

As you are aware, we have been told that our old cars must go because of their 'dirty' exhausts, in particular the lead issuing forth and causing great public health problems.
Dr David Warren was the guest speaker at the quarterly meeting of the AOMC

(Vic) on 28 February 1994. Dr Warren is a retired Research Scientist for the Department of Defence and was the Energy Resources adviser to the Victorian Government back in the early/mid-'80s when the ULP debate was gathering momentum. Here is a condensed summary of Dr Warren's address.

ENTER LEAD

"In the early 1920s, a fellow called Thomas Midgie was looking for something to combine with the free radicals to stop 'knocking'. He found that things like platinum, silver and lead were able to hold these free radicals. Midgie figured that if he could get lead oxide spread through the mixture, sooner or later the free radicals would bump into a bit of lead oxide, which forms lead dioxide, as lead has four bonds, but that breaks down to lead, Pb2, and oxygen, O2, but slowed down the reaction.

"In searching for a way to get the lead spread through the mixture, Midgie found a compound called lead tetraethyl which is similar to the combinations in the groups making up petrol. The first good thing about it is because it is like petrol, it is soluble in petrol. The second is that it vaporises like petrol, which means that the lead tetraethyl is dotted around in the mixture. The third thing: it breaks down to lead at upper cylinder temperatures, lead atoms spread around and the ethyls are let go. Then the lead does its job, combining with the free radicals and slowing down the reaction.

"Midgie's research took the octane number from 50 to 65; then research at the refinery introduced crackling reforming and improved the octane number past 89; then, with further developments and money, they got the octane number up to 110 for aviation fuel.

ENTER THE GREENIES

"'Clean up car exhausts' was the cry. By 1975, lead was being reduced in petrol because lead is a poison-that is a general statement; however, to get the fact exact you should say lead is a poison when it is absorbed into the body.

"Now, the fact that lead is a poison if absorbed, does it follow that the lead in our bodies is from the lead in petrol? That was the debate in the early '80s. There were a large number of contradictory reports in the papers, and the National Energy Advisory Committee reported 'no single case of clinical lead poisoning has ever been demonstrated to be due to automotive emissions of airborne lead'.

"There were tests and arguments all over the world. In Frankfurt, the government decided they would cut the lead in petrol from 0.4 to 0.15 grams per litre, about two thirds. Now if the lead was a problem, it should have an

effect on the community. If petrol is causing part of the lead in the community and you cut it by two thirds, any scientist knows it must have an effect, otherwise it had nothing to do with it.

"The nett result: 'Since the changes observed are only of the order of statistical scatter (that is, you would never measure anything and get the same thing twice), this indicates that lead from petrol did not contribute to uptake by ingestion through significant deposition on food and utensils as has been suggested. If it had done, greater and continuing decrease in blood levels in the community should have been observed.'

"In other words, they measured nearly a thousand people over a five-year period and there was no change at all despite cutting the lead content in petrol.

"In London we had Professor Lowthur of the University of London pointing out that the lead that comes out of the exhaust has been baked at 2,000-3,000 degrees Centigrade, like a house brick, but so small that you need a microscope to see it. It doesn't get absorbed through the lungs and doesn't even dissolve in the diluted hydrochloric acid of the stomach.

"It appears that the lead in the air is not the source of the lead that is observed in the community.

"Besides, you can measure the lead coming out of the cars and it settles. You measure it as grams per cubic metre at the edge of the road, but if you go back ten feet it is less because it's very heavy dust. Even though it's very small particles it is very heavy."

ENTER THE POLITICIANS

(In 1983 Dr Warren was the scientific adviser to the committee for Energy Resources.)

"The question came up: 'Will we ban lead in petrol?' The real question was will we have ULP?' The real reason for ULP was that people wanted to fit catalytic converters on their cars to get rid of the nitric oxides, carbon monoxide and unburnt petrol that came out, but the lead spoilt the catalytic converters. That was the reason that the rest of the world gave up lead in petrol. The other countries banned it to bring in converters; we banned it because we think it's dangerous.

"So I (Dr Warren) prepared a speech and convinced the Committee-about a dozen people from both parties-that lead didn't need to be banned and that we didn't need lead-free petrol because the evidence wasn't there.

"I prepared a subsequent speech presented to Parliament by the then-State Member for Ballarat. At the same time there was a paper from Dr Bell, the Director of Health of the New South Wales Government.

"Dr Bell asked what was going to be added to the petrol to raise the octane number if the lead was removed: 'If the lead is taken out, you have to add other things to run them in our cars; we put in benzene, toluene, xylene, dimethylbenzene or mesitylene. They're all ring compounds and the dangers are that some of them are declared carcinogens and the others are suspected carcinogens. We're going to cut lead even though there is no proof that it does anything wrong, and we're introducing substances which will ultimately be affecting the cancer rates in our country.'

"The answer was: 'We have converters and they will destroy them', but we all know that converters don't work until they are hot-about the first three miles or so-and every time you fill up, the vapours are coming off.

"Now when the speech was delivered to Parliament, there were only two people listening: myself (Dr Warren), to see that he got it right, and the Member giving the speech. It seems that the prevailing attitude was: 'Don't confuse us with the facts; our mind is made up, the people want it and that is where the votes are.'

"Nobody listened to that speech because it was party policy: both parties said, 'No, we've decided-it doesn't matter what the man says; go and have a drink at the bar and when the bell rings we'll come in and vote'-and that's how it was decided!"

ULP HEALTH RISK

Even at that stage, Dr Warren had found that the lead problem was highly overstated and that the potential hazards from the aromatic octane enhancers-like benzene-were greater than the perceived lead problem.
"In fact, this stuff appears to be so dangerous, potentially lethal, that I urge you not to use it in any car not fitted with a catalytic converter. Don't use it in your mower, chainsaw, whipper-snipper or outboard motor, and don't wash parts in it. If any gets on your skin, wash it off immediately. Avoid the fumes when refuelling and don't allow anyone near the exhaust, particularly when the exhaust system is cold. Remember that catalytic converters don't work until they reach some 400 degrees C."

In Britain, this risk is so clear that the National Society for Clean Air has removed their support for ULP!

Dr Warren's research showed that the lead in blood comes not from breathing

airborne lead but from eating and drinking it-that is, principally from soldered food containers, lead-based paints and lead pipes.

In fact research showed that the blood lead levels were higher in country people drinking bore water, such as the New Guinea highlanders and peoples on remote islands, without motor vehicles than in blood samples taken from those living in the heart of Melbourne.

ALTERNATIVE

You will recall in the past I have referred to a device invented by Mr A. Bodycomb. This device would do essentially the same job as a catalytic converter, that is, remove carbon dioxide and unburnt fuel from car exhausts, but it would also remove lead-so there would be no need for ULP!

This device was tested in the early '70s, but those testing it seemed conveniently to forget the test results later, favouring instead the dry converter that we now have.

Mr Bodycomb lives in Melbourne and even now cannot get anyone interested enough to have a look at it.

(Source: Extracted from an article by Graham Allum, published in Restored Cars Magazine #104)

THE COMPOSITION OF PETROL

Last issue we discussed how there was little evidence to support the claim that the octane-raising substances in unleaded petrol are safer than the lead compound used. In fact, there was little or no evidence to support the claim that lead in petrol has any effect on the levels of lead in the blood. Unleaded technology means something else is added to the petrol to maintain its octane number. What has not been made very clear is that since about 1970 the lead content in leaded petrol has been reduced. Policy has meant that, over time, lower and lower maximum lead levels have been set.
There are three main groups of substances the oil companies use instead of lead.
1. Aromatics-organic compounds based on the benzene ring, a 6-carbon ring with 3 delocalised double bonds, e.g., benzene, toluene, xylene, etc.
2. Olefines-organic compounds which have double bonds. After combustion,

one critical by-product is 1,3-butadiene.
3. Oxygenates-organic compounds containing oxygen molecules such as methane, ethane or MTBE (methyl-tertiary-butyl ether).

The US Environmental Protection Agency has targeted five toxic air pollutants-benzene and 1,3-butadiene are the top two on the list. They are both highly carcinogenic substances. 1,3-butadiene has only just come to international attention.1

Therefore, there is one very important question to ask. What is the present composition of leaded, regular unleaded, and premium unleaded fuel?

In Australia, oil companies do not have to release the exact formulas for making up the petrol mixtures. In Britain it is the same as in Australia: the oil companies provide almost no information about the chemical content of lead. In the US, oil companies have to release the petrol formulae to the US EPA. I managed to find an independent study, done by Dr Michael Dawson and Mr. Noel Child of the University of Technology, Sydney, which analysed the composition of many petrol samples from all over Australia.2 They also compiled a table of petrol compositions from many other countries (see Tables 1, 2 and 3). These figures came from the "International Gasoline Survey, 1994", a report published annually by Associated Octel Company.

Table 1: Premium Unleaded Gasolines—An International Comparison (N. G. Child/Dr M. Dawson, 30/3/95)

COUNTRY	SAMPLE DATE	GRADE	RON *	SATURATES (% v/v)	OLEFINS (% v/v)	AROMATICS (% v/v)	OXYGENATE (% v/v)	BENZENE (% v/v)
USA	Winter 93/94	Premium	97.6	58.4	7.4	29	5.3	1.1
GREAT BRITAIN	June 1994	Super	98.3	52.4	7.3	38.4	2.1	2.5
GREAT BRITAIN	June 1994	Premium	96.3	59.1	9.3	30.2	1.3	2
SINGAPORE	Late 1992	Premium	97.9	47.6	2.3	43.7	6.4	3.5
AUSTRALIA	**Oct/Dec 1994**	**Premium**	**95.9**	**55.6**	**7.9**	**36.4**	**0.0**	**3.3**
ITALY	January 1993	Premium	96.4	58.2	10.7	31.1	4.1	1.6
NETHERLANDS	January 1993	Premium	98.4	59.2	2.9	37.9	6.6	1.7
FRANCE	January 1993	Premium	98.7	50.1	6.5	43.4	2.7	2.6
GERMANY	January 1993	Premium	96.5	52.6	7.7	39.7	2.0	2.3
NORDIC	January 1993	Premium	96.0	55.8	7.3	36.9	4.6	2.7
SPAIN	January 1993	Premium	96.1	47.6	13.6	38.8	5.6	1.7
MID-EUROPE	January 1993	Premium	95.4	55.4	6.9	37.7	4.4	1.8

Table 2: Regular Unleaded Gasolines—An International Comparison (N. G. Child/Dr M. Dawson,								
COUNTRY	SAMPLE DATE	GRADE	RON *	SATURATES (% v/v)	OLEFINS (% v/v)	AROMATICS (% v/v)	OXYGENATE (% v/v)	BENZENE (% v/v)
USA	Winter 93/94		92.1	58.7	12.9	24.4	4.1 (MTBE)	1.10
USA	Winter 93/94		94.2	58.3	11.3	26.1	4.5 (MTBE)	1.11
GREAT BRITAIN								
SINGAPORE								
AUSTRALIA	**Oct/Dec 1994**		**91.5**	**59.6**	**12.7**	**27.7**	**0.0 (MTBE)**	**2.0**
ITALY		Regular						
NETHERLANDS								
FRANCE								
GERMANY	January 1993		92.7	58.6	12.0	29.5	1.3 (MTBE)	1.6
NORDIC								
SPAIN								
MID-EUROPE								

Table 3: Premium Leaded Gasolines—An International Comparison (N. G. Child/Dr M. Dawson,									
COUNTRY	SAMPLE DATE	GRADE	RON *	LEAD (g Pb/L)	SATURATES (% v/v)	OLEFINS (% v/v)	AROMATICS (% v/v)	OXYGENATE (% v/v)	BENZENE (% v/v)
USA	Winter 93/94	Leaded	94.4	n/a	57.2	11.0	22.8	9.0 (MTBE)	1.1
GREAT BRITAIN	June 1994	Premium Leaded	97.7	0.126	59.7	13.8	25.7	0.7 (MTBE) 0.1 (TAME)	1.7
NEW ZEALAND	1992/93	Leaded	97.6	0.32	66.6	0.8	32.6	not available	3.2
AUSTRALIA	**Oct/Dec 1994**	**Leaded**	**96.4**	**0.216**	**58.4**	**12.4**	**29.2**	**0.0 (MTBE)**	**2.1**
ITALY	January 1993	Premium	98.0	0.13	58.4	9.7	31.9	2.2 (MTBE)	1.9
NETHERLANDS	January 1993	Premium	98.3	0.14	56.2	5.4	38.4	0.7 (MTBE)	2.4
FRANCE	January 1993	Premium	97.8	0.14	50.5	17.0	32.5	0.7 (MTBE)	1.7
GERMANY	January 1993	Premium	99.2	0.13	54.2	5.8	40.0	2.3 (MTBE)	2.3
NORDIC	January 1993	Premium	99.3	0.06	53.5	4.4	42.2	6.5 (MTBE)	2.9
SPAIN	January 1993	Premium	98.3	0.12	49.4	14.1	36.5	4.3 (MTBE)	1.9
MID-EUROPE	January 1993	Premium	96.9	0.13	60.4	6.8	32.8	2.8 (MTBE)	1.6

Using the figures for Australia as an example, in regular unleaded petrol, the total aromatic content was 27.7%, and benzene level at 2.0% (Table 2). But, for leaded petrol, the total aromatic content was 29.2%, and the benzene level at 2.1% (Table 3). Wow! This means the total aromatic content and the benzene levels are very similar-actually, marginally higher in leaded petrol. If you look at all the other countries in the tables, the percentage content of benzene and total aromatics in leaded and regular unleaded petrol is also very similar.

Standard unleaded petrol has a lower octane number of around 91, whereas leaded petrol has an octane number of 96 or higher. The lead compound added is just enough to increase the octane number from around 91 to over 96. Premium unleaded has an octane number of 96, so it has much higher levels of aromatics-as well as benzene-than other fuels. For premium unleaded petrol in Australia, the total aromatic content was 36.4%, with benzene level of 3.3% (Table 1).

This analysis of Australian petrol was conducted before 1st January 1995. At this time, maximum lead levels were at 0.3 grams per litre. After 1st January 1995, the maximum lead levels were reduced to 0.2 g/litre, which means that

more of these alternative additives-the aromatics, including benzene, and/or olefines-have been used. So, leaded petrol today could have even more alternative additives than regular unleaded petrol.3

Dr Michael Dawson says that "Eventually, the lead content in leaded petrol will be reduced to almost nil" in Australia, "and we will have cars not fitted with catalytic converters spewing out tons more air toxics each year than is currently the case."3

The third group of alternative octane-raising substances mentioned above are the oxygenates. A major by-product of their combustion is acid aldehyde-the first substance the body produces in the alcohol-detoxifying process.1,4 So it seems that the oxygenates are less toxic than benzene and 1,3-butadiene.

Another advantage of oxygenates is that, because they contain oxygen molecules, they cause the fuel to burn more efficiently-and thus lowering the levels of all pollutants from car emissions.4

Oil companies in Australia don't use these oxygenates because they are not by-products of petroleum production and would have to be purchased from other chemical companies, thus making them more expensive.1

The US EPA mandated that from 1st January this year, a "reformulated gasoline" is to be sold in approximately 25% of the USA.5 A limit of 1% of benzene (10% of total aromatic content) is set for this fuel. EPA sources predict that market share for reformulated gasoline will eventually be 70%.1

The oxygenate MTBE is one of the substances of concern, mentioned in the article extract from Dr Hans Nieper which follows on page 29. (Note: Australia is the only country listed in the tables whose petrol contains no MTBE.)

Taking this into consideration, ethanol and methanol may be the safest additives-or should catalytic converters be phased out of use? Definitely, many more studies have to done on the exact effects of these chemicals.

AIR POLLUTION

Dr Michael Dawson explains that when the oil companies removed lead from US gasoline in the 1980s, the increased aromatic content had two deleterious effects:

"Firstly, air pollution became worse because aromatic compounds are very photochemically active. Secondly, tailpipe emissions of the carcinogen benzene increased."6

BENZENE IN THE ATMOSPHERE

The carcinogen benzene is an inexpensive substitute for lead. As an example, in Germany in 1993, 32 million tons of fuel were burnt. Around 10 million tons of aromatics were in this fuel-and at least three-quarters-of-a-million tons would have been benzene. A significant amount of this fuel finds its way into the atmosphere as benzene.7

In 1991 in Germany, about 100,000 tons of fuel escaped during transport from refinery to filling station; 45,000 tons escaped while gasoline was being pumped into gas tanks, and another 33,000 tons escaped from car motors.7

Dr Michael Dawson has taken benzene readings in Sydney over an entire month in summer and an entire month in winter. The measurements revealed average benzene levels of 4.1 parts per billion in summer, and 7.6 p.p.b. in winter. Peak concentrations reached between 12 and 25 p.p.b. respectively. These readings were taken at the same place in the city where carbon monoxide levels are monitored by the EPA.2,8

Britain has recently adopted a maximum of 5 p.p.b. of benzene and has a national target to decrease levels below 1 p.p.b.

Dr Michael Dawson says, "Australia has no safe standard for benzene, and its environmental authorities do not carry out regular monitoring."8

The Victorian EPA conducted a study in 1992-93 which found benzene levels in Melbourne's inner suburbs of up to 6 p.p.b. This agency sets a preferred limit equal to about 30 p.p.b. They quote studies which show that over 75% of benzene in the air of industrialised cities comes from vehicle emissions.9

Tests of benzene levels in Baden-Württemberg, Germany, measured statewide average values of between 6 and 46 micrograms of benzene per cubic metre (approx. 2 to 15 p.p.b.). Traffic in Stuttgart produced monthly peak values of up to 62 micrograms (approx. 21 p.p.b.). The Swabian Environment Minister, Harold Schäfer commented that the levels were "Frightening, ...indeed, dramatically high."7

Harald Notter, spokesman for the environment minister, aware that the Baden-Württemberg case is unique in Germany, says, "Most of the German states approach the benzene issue with great caution, afraid of the costs and perhaps also of the results."7

In Britain in 1994, a cross-party group of MPs called on the government to ban sales of super unleaded petrol. The recommendation was one of many aimed at reducing air pollution.

The MPs said that evidence "strongly suggests that the potential health hazards resulting from the excessive aromatics used...outweigh any possible benefits from the reduced lead." They would also like the composition of petrol to be publicised so that people can judge for themselves the environmental effects of different types of fuels.10,11

In Switzerland, it is now compulsory for every petrol pump to be fitted with a negative-pressure vapour hood. This is a device that pumps all the air that is displaced by the petrol, into a holding tank. Therefore, the fumes do not escape into the atmosphere, and a little petrol actually recondenses in the holding tank.

They also use this method in some parts of the US, but there are no plans to use these in Britain or Australia.

HEALTH EFFECTS OF AROMATICS, ESPECIALLY BENZENE

Dr Arthur Chesterfield-Evans, an occupational health expert, believes the public had been misled by claims that by removing the lead from petrol, its negative environmental and health effects have been reduced. He says, "We have been subject to a concentrated disinformation campaign in the form of a seductively simple 'no lead, no worries' message."8

The US EPA claims that half of all cancer cases may be related to air pollution.9 For a lifelong exposure to a microgram of benzene per cubic metre (approx. 1 part per billion), it estimates that 2.8 people per million will be diagnosed with leukaemia. The World Health Organisation comes up with a figure of four leukaemia cases per million, and the German Cancer Research Centre with nine projected cases.7

Professor Cesare Maltoni, of Italy's Ramazzini Foundation for Oncology and Environmental Science, has directed studies showing that cancer is linked to substances from vehicle emissions. For 25 years his Foundation has tested on animals scores of substances found in vehicle emissions.

In 1977, Prof. Maltoni's Foundation showed that benzene was a powerful carcinogen causing many types of cancers, particularly leukaemia. Many other aromatics were tested and they all proved to be carcinogenic. Several other compounds contained in vehicle emissions were also found to be carcinogenic.

Professor Maltoni said, "There are risks with gasoline containing high aromatic hydrocarbons, risks with US gasoline containing high paraffin content, and risks with oxygenate-additive gasolines. Particular concern must be attached to gasolines with a high aromatic hydrocarbon content. Benzene is one of the most powerful industrial carcinogens. Alkyl benzenes likewise entail cancer

risk."12

Many alkyl benzenes break down to benzene in the combustion process. Dr Michael Dawson says that approximately 50% of the benzene emitted from the exhaust comes from the actual benzene in the fuel, 40% is from the toluene (methyl benzene), and 10% from other aromatics in the fuel.1

Dr Simon Wolff, of University College London School of Medicine, was originally concerned about Britain's nuclear power- plants. He noticed a tenfold difference in childhood leukaemia rates between certain populations, so he began searching for explanations. He concluded that newer middle-class suburbs and towns with high levels of car ownership and use were the most at risk.

Dr Wolff says that Britain's plan to cut benzene levels to one p.p.b. is still not enough. "We should be aiming to lower the lifetime risk of leukaemia to one in a million, compared with 10,000 at present. To achieve that we have to cut benzene levels by fifty- or one-hundredfold."12 Children could develop cancer at much lower benzene exposure levels than adults, because they breathe faster, have much faster metabolism, and their bone marrow is more sensitive.

Studies from Sweden have found unexpectedly high levels of leukemia in petrol-station workers.13

Dr Michael Dawson asks, "Why are oil companies allowed to substitute a carcinogen (or compounds which are converted to a carcinogen) for a neurotoxin?"6 The carcinogen is released into the air we breathe, while the neurotoxin it replaces comes out of the exhaust as lead oxide or lead chloride which is baked hard and falls to the ground near the road.1

Professor Roger Perry says, "I find it really difficult to understand how any government or any serious scientist could take the issues of low levels of lead seriously, and decide to ignore issues such as benzene where levels are already high enough for concern."9

Professor Bill McCarthy, head of the Sydney Melanoma Unit, Royal Prince Alfred Hospital, Sydney, says: "Benzene is a highly carcinogenic agent. It causes lung tumours, liver tumours, renal tumours, kidney tumours, leukaemia and skin tumours."13

The worrying thing is that whether someone gets cancer from exposure to chemicals is an individual thing; it all depends on tolerance levels. People can take on a certain load of toxins, then all of a sudden a bit more will make them really sick.13 For example, people afflicted with Chronic Fatigue Syndrome may feel good one day, but the next day they can't get out of bed.

If you recall, in NEXUS vol.2#23 we published an article by Dr Hulda Regehr Clark, suggesting a link between the solvent benzene and HIV/AIDS-so the implications are of great concern.

HEALTH HAZARDS OF AVIATION FUEL

Aviation fuel contains aromatics including benzene. Michael Dawson, Brent Young and Noel Child have presented a report to a Commonwealth Government Senate Committee on Air Traffic Noise in Sydney. They suggest that with an already high base-concentration of benzene and other pollutants from car emissions, the extra pollutants-especially benzene from air traffic-put people under the flight path at extra-high risk. Their report contains data showing quite high monthly average benzene levels-up to 10.6-under the flight paths from Manchester airport. They say it is "located in an essentially rural environment, and these benzene concentrations can be reasonably assumed to result almost entirely from aircraft rather than motor vehicle emissions."18

WHICH FUEL TO USE?

In Australia, there is a campaign to encourage owners of pre-1986 leaded petrol-run vehicles to use unleaded petrol.5,16

My research shows there is little difference in the aromatic levels-so, on that account, it should make no difference which you use. You'd swap a little lead for 5 or 6 points of octane number.

With pre-1986 cars, if you do use ULP, the lack of lead will cause the bores to wear out more quickly. Unless you have hardened valve seats, they will slowly settle into the head (but, in any case, the valve seats in today's vehicles are not always hardened).1

However, I would definitely not recommend using premium unleaded fuel because of its much higher aromatic content.

The question remains to be asked: "Why are catalytic converters so important to have fitted on cars designed for unleaded petrol, when the leaded fuel we still buy for cars without catalytic converters contains the same composition of aromatics?"

In New Zealand the situation is different. ULP technology has been introduced without any cars being fitted with catalytic converters.1,17

(By the way, Associated Octel is the company that makes the lead compound used in petrol.4 The petroleum cartels once owned Associated Octel, and all

but sold it off after the introduction of unleaded technology-so any reintroduction of lead would not be in their interests.)

CATALYTIC CONVERTER CHAOS

In theory, a catalytic converter is supposed to convert 90% of the unburnt part of the fuel and turn it into a safer substance.4 But in practice, as mentioned in the last issue, they take 10-15 minutes to warm up before they work, and they cease to work after 40,000 to 50,000 kilometres. So, much of the time, they'd definitely not be doing what they're supposed to be doing.

"They supposedly fall off" in efficiency, "but there's been no work done in this country on it," says Ron Castaldi of the Australian Institute of Petroleum.9

In 1994, the Australian Committee on Vehicle Emissions and Noise (ACVEN) started a survey to check emissions from 600 cars nationwide. "Benzene is not one of the controlled emissions," says Project Director Peter Anyon of the Federal Office of Road Safety.8

Professor Roger Perry, Professor of Environmental Control and Waste Management at London's Imperial College of Science, Technology and Medicine, asks, "Do you remove 95% of hydrocarbons when the catalyst is new, and then 60% in three years' time? Does the 60% mean the easy ones, and the difficult ones are not being removed? No one can answer that. Benzene is a stable aromatic material; the odds are that it would be one of the last to be oxidised. The more inefficient the catalytic converter becomes, the more benzene would get through the system."9

Noel Child says it's actually very similar technology to the process used in oil refineries to make benzene from straight chain molecules: it all depends on the operating conditions.4 The manufacturers fit the converter, and away goes the car-but what's really going on there is a mystery.

Hydrogen sulphide (rotten-egg gas) emissions can also regularly be detected from cars with catalytic converters. According to Noel Child, the gas tends to be emitted from newer vehicles. H_2S is a highly toxic substance able to attach itself to haemoglobin and thus block oxygen absorption.4

The extract commencing on page 29 is by Dr Hans Nieper of Hannover, Germany, who has made some very interesting discoveries about what actually goes on inside catalytic converters.19

CONCLUSION

One thing that's very apparent is that vested interests want to withhold this

information from the public. Aromatics are the least expensive of the octane-number increasing fuel additives. Having catalytic converters on cars makes many people believe that most of the toxic fumes have been greatly reduced.

But, for sure, there is now greatly increased interest in this subject. For example, the Royal College of Physicians, London, is having an International Air Toxics Conference in November this year. At least two presentations will be from Australia, with Noel Child presenting a paper titled, "In Search of a Green Gasoline". Dr Michael Dawson and Noel Child will also be presenting their research into benzene levels.

Footnotes:

1. C. Simons telephone conversation with Dr Michael Dawson, Department of Chemistry, University of Technology, Sydney, Australia, May 1995.
2. Dr Michael Dawson and Noel Child, "Study of Benzene Levels in Sydney", University of Technology, Sydney, Australia, published August 1994.
3. Dr Michael Dawson, "Benzene, the Devil Around the Corner", letter published in *The Australian*, 28 September 1994.
4. C. Simons telephone conversations with Noel Child (Ph.D. pending), consulting engineer and lecturer in Environmental Engineering at UTS, May 1995.
5. Dr Michael Dawson, "Not Overlooking US Experience", *The Australian*, 19 September 1994.
6. Dr Michael Dawson, "No Simple Solution to Lead-Free Petrol", *The Daily Telegraph-Mirror,* 10 November 1994.
7. In-House Staff, "Hushed-up Dangers", *Explore!*, vol. 5, nos. 5 and 6, 1994.
8. Julian Cribb, "Cancer Chemical Detected in Air", *The Australian*, 12 August 1994.
9. Simon Grose, "Choose Your Poison," *The Canberra Times*, 26 March 1994.
10. "Ban Urged on Super Unleaded Fuel", *The Guardian Weekly* [UK], 6 November 1994.
11. "No Turning Back to Leaded Petrol, Say MPs", *New Scientist*, 29 April 1995.
12. Julian Cribb, "Scientists Debate Carcinogenic Risk of Cars", *The Weekend Australian*, 13-14 August 1994.
13. Darcy Maddock, "Leaded Versus Unleaded Petrols", *Australasian Health and Healing*, November 1994-January 1995.
14. C. Simons telephone conversation with Prof. Bill McCarthy, Executive Director, The Sydney Melanoma Unit, Royal Prince Alfred Hospital, Sydney, Australia, May 1995.
15. Hulda Regehr Clark, Ph.D., N.D., *The Cure For HIV and Aids: With 70 Case Histories*, ProMotion Publishing, San Diego, California, USA, 1993.
16. Jack Haley, Manager, Vehicles and Environment, NRMA, letter published in *Australasian Health and Healing*, vol. 14, no. 2, February-April 1995.
17. "One Petrol Problem Swapped For Another: Expert", *Wheels Weekly* [New Zealand], 11 November 1994.
18. Dr Michael Dawson, Brent Young and Noel Child, "Air Quality Considerations, Kingsford Smith Airport", University of Technology, Sydney, Australia, May 1995.
19. Dr Hans Nieper, "Nerve Gas from Cars with Catalytic Converters", letter published in *Townsend Letter for Doctors*, December 1994.[* Note ref. Tables 1, 2, 3: RON = Research Octane Number.]

NERVE GAS FROM CARS WITH CATALYTIC CONVERTERS

by Dr Hans A. Nieper

Some of you may have read the latest edition of "Steuerbegunstigter Lungenkrebs" [approx. translation, "Tax- Privileged Lung Cancer"], the 100-page documentation concerning the dreadful problems associated with platinum catalysts in the exhaust gas systems of automobiles. Let me refer at this point to this documentation: none of the facts I described in such documentation has had to be revised or withdrawn to date. Car drivers are now being confronted with the indirect economic problems I predicted in this documentation: if the catalytic converter does not meet the [recently introduced] compulsory exhaust gas tests which will occur rather often. Repairs will have to be made which could pose an extreme burden for some families, going as far as compelling them to skip their annual vacation, for example.

I was slandered in a very ugly manner by ADAC [the German automobile club] and by the industry, e.g., by the spokesman of Shell AG, following the interview I gave on ZDF (right after the TV series, *Black Forest Clinic*) in July 1987, because I wanted to make people aware of the problems associated with benzene intoxication through unleaded catalytic converter gas. What has become of this? There is still too much benzene in the 'cat. gas'. This carcinogenic benzene which is easily soluble in fat, has even been detected in candy bars sold at gas stations. After this, I was disparaged because I attributed a potential carcinogenic effect to toluene, a methyl benzene-large quantities of which are contained in unleaded gas.

I had thought that I had described exhaustively the information an analyses of the 'cat.' problem until 1991, as reported in "Tax- Privileged Lung Cancer". However, the facts we have gathered since April 1991 overshadow even the darkest fears we had previously.

For me, this new development started with a detailed feature by Larry King-broadcast at Easter of 1991 by CNN-which I had the opportunity to watch in Florida. Larry King is number one among all of the highly efficient TV moderators in the US. The subject matter of the discussion was the so-called chronic fatigue syndrome (CFS)-a recently discovered disease in the US. It has also occurred in Japan ("man-killing syndrome"), in large Australian cities (where they drive Japanese cars), and particularly in Switzerland.

The symptoms of CFS are as follows: people become tired and exhausted, even during the day after having slept well the night before. A little over 60%

become easily depressed. This depression does not react to the usual antidepressants. Furthermore, various chronic infections occur-in particular, infections of the lymph system, of the urinary passage and the respiratory tract-frequently accompanied by lymphoma and chronic tonsil enlargements. For this reason, it is now believed in Germany that CFS has to be a "virus disease". As long as 10 years ago when CFS was first observed in resorts situated at Lake Tahoe, patients showed a dominant infection with herpes viruses or the presence of very high herpes immune titres (IGG herpes titres). Since that time, many publications have been written on the infection problems of CFS patients, which all come to one conclusion: in the case of CFS, all kinds of infections occur in an accumulated manner, in particular through herpes (potentially carcinogenic and causing leukaemia), with cytomegalic viruses (also carcinogenic with respect to the kidneys and other abdominal organs), all kinds of bacterial pathogenic organisms, which are, in part, highly toxic and may lead to life-threatening pneumonia, and, finally, mycosis is frequently detected in CFS patients.

The conclusion from all these observations: In the case of CFS, there is severe general lowered resistance, which is mainly found in the cellular areas, i.e. in the area of cell membranes. This infectious, unspecific mixed evidence is called "occupational" infection, the main cause of which is lowered resistance.

Based on the extremely good information provided by the Larry King program on CNN, it became evident that CFS is unequivocally connected to the spread of catalytic converters in automobiles.

Shortly after my return from the US in 1991, everything went like clockwork:

1. A leading American platinum metallurgist pointed out to me that a catalyst must produce phosgene whenever chlorides are present in gasoline. This is virtually always the case. Not until 1993 did a fuel-producer provide the information that a certain compound of chlorine was being used as an "additive" in gasoline. Phosgene (COC14) is a war gas, used in World War I, with a toxic effect on the lungs.

2. Mr K., who has unfortunately died in the meantime, and who had constant access to all of the new technical developments by Volkswagen at Wolfsburg, came to meet me, showing all signs of outright panic: "Volkswagen gave me the order to cause Gotze plant at Burscheid to develop piston packings which are so tight that you cannot think of anything tighter."

This has a chemical background: unleaded cat. gasoline contains high quantities of MTBE (methyl-tert-butyl ether), which is necessary as an anti-knock substance (replacing tetraethyl lead [TEL]). In the meantime, the MTBE content has been increased in order to facilitate a higher specific engine

performance. For the same reason, by the way, the benzene share of 5% has remained unchanged and is 'criminally' high. (In the US, this share is 1%.)

Engine oil contains an additive, zinc dithiophosphate [ZDTP], which cannot be dispensed with as it guarantees the longevity of engine oil. "If MTBE and ZDTP interact under heat, obviously something catastrophic is going to happen," Mr K. said.

If MTBE and ZDTP interact, phosphoric ester and similar compounds may be created, which fit into the group of nerve gases (Tabun, Sarin, E-605, etc.). At the end of 1993, I turned to a highly qualified full professor of the Medical School at Hannover concerning this problem. He asserted that, besides phosphoric esters and phosphines, the MTBE-ZDTP reaction could generate enols which block vital enzymes more than hydrogen sulphide (H2S) does, also coming out of the car cat. in huge quantities.

3. Shortly after Mr K.'s visit, Mr v.W. of Hannover, unfortunately also deceased in the meantime, turned to me: "My little son caught a large number of houseflies alive. We held one half of these flies in a net approximately 50 centimetres [approx. 20 inches] behind the exhaust of quite an old car. The flies were rather groggy, but they survived. The other half was held behind a cat. exhaust. All of them were dead after 110 seconds, it being noticeable that they died virtually all at once."

This was Mr v.W.'s description. The occurrence of death "all at once", i.e., without a broader statistical distribution over a certain period of time, is typical of the effects of phosphoric esters and/or enols-that is, of substances that can block the cellular respiratory chains.

4. Since 1986, an assembly foreman or engineer working for Mercedes-Benz in Sindelfingen has contacted me several times by telephone. He reported a sudden introduction of protective measures for the cat. assembly, and other measures which were supposed to be kept secret according to Mercedes-Benz and which were related to the platinum problems.

In 1991, this gentlemen called me once more: "Doctor, please help us! The exhaust of the cat. gasoline cars (not the cat. diesel cars) releases toxic gas, and this to a very high degree. The problem is especially critical after the car has been driven for about 15,000 kilometres [approx. 9,400 miles], when the gaskets are no longer in peak condition."

About three days after this late evening call, I heard a report on my car radio, according to which Mercedes-Benz had given out a warning concerning the "toxic side-effects" of the catalytic converter technology which could become "important after the car had been driven for about 15,000 kilometres."

As far as I know, diesel fuel does not contain any MTBE, so that the production of nerve gas is not to be expected with a diesel car.

This was about the state of our knowledge concerning the problem associated with nerve gas-except for the enol aspect -until the end of 1992. I had a report on this topic published in *Townsend Letter for Doctors* in July 1991. Due to the extreme explosiveness of this subject, *TLfD* published my information in the most expedient way. And, of course, all *Raum & Zeit* readers are aware of the problem. No action, however, has been taken by Topfer, the Minister for the Environment, who is responsible-as was the case after 1987 concerning the benzene problem.

In the meantime, the occurrence of CFS has increased in Germany, but life goes on in the same old way. I also believed that everything had been said concerning the subject of catalytic converters and nerve gas-until, in 1993, a cruel discovery was made...

THE COMPOSITION OF PETROL

In regard to additives in our petrol, the main question that needs to be asked is: "Why was all the fuss made about one toxic substance-lead-in our petrol, when the substances that have replaced it-benzene, other aromatics and olefines-appear to be more toxic?' It seems to me that if the genuine reason for taking lead out of petrol was for health reasons, efforts would have been made to ensure that what was used as a substitute was safer. There was little, if any, coverage at the time about what would be used instead of lead. In fact, petroleum companies, in Australia at least, don't even have to disclose the formulae they use to make up the petrol. Note that catalytic converters would quickly become useless if lead were in the petrol.

Benzene is a well-known carcinogen. Many medical studies have proved this to be the case. For example, Prof. Bill McCarthy, Executive Director of the Sydney Melanoma Unit, Royal Prince Alfred Hospital, is extremely concerned about the benzene levels in Sydney's centre and under aeroplane flight paths.1 Dr Michael Dawson and Noel Child have taken benzene levels in Sydney and shown they are extremely high. Average levels were at 4.1 parts per billion (ppb) in summer and 7.6 ppb in winter, peaking at 12 ppb and 25 ppb respectively. Toluene levels were much higher.2 Other cities around the world also show high levels. Britain has adopted a maximum of 5 ppb, with a national target to decrease levels below 1 ppb.

Benzene levels in fuels are around 2-3%, but total aromatics are between 20-40%. It is important to realise that when these aromatics are combusted, a

large percentage comes out in the exhaust as benzene-so the levels of benzene would be much higher than first expected. Many other aromatic substances also exist in exhaust gases, but all their effects, as well as human tolerance levels, have not been fully researched. Prof. Maltoni of Italy has directed studies researching the biological effects of benzene and many other substances from vehicle emissions. No studies have been done in Australia even to try to determine the total composition of exhausts.

One study, directed by Peter Anyon of the Federal Office of Road Safety3, is analysing exhausts from 600 cars in order to find quick, cheap exhaust-monitoring methods and to determine whether subsequent appropriate mechanical work will reduce emissions. Initially the study was testing only for substances that are well known as problematic, i.e., listed in the Australian Design Rules as dangerous. These are total hydrocarbons, oxides of nitrogen, and carbon monoxide. But last year, when it became more well-known that benzene was a problem, an extension was added to the study to measure seven speciated hydrocarbon levels in 50 of the vehicles being tested. These include benzene, xylenes (three species), toluene, and 1,3-butadiene. It's a start.43

Dr Hans Nieper reports on a new exhaust substance apparently produced in the catalytic converter, the consequences of which are quite shocking. What other reactions are occurring in catalytic converters that we don't know about? Are there any other dangerous exhaust gases whose effects we are yet to discover or fully realise?

An important product of the combustion of olefines is 1,3-butadiene, another substance that scientists have only recently discovered to be highly toxic. Much more research is needed here.

One other key aspect of all this is that the lead levels in leaded petrol have also been reduced. In fact, the benzene and total aromatics levels in leaded and standard unleaded petrol are virtually the same in many countries. The additional lead content is the only major difference between standard ULP and leaded petrol. The levels of benzene and other aromatics in premium unleaded fuel are extremely high-so I would urge people never to use this fuel.

Lead itself is undeniably a toxic substance. Much research has been done around the world to show its toxicity and effects. However, studies have failed to show the correlation between lead in petrol and lead in blood.4 It seems that the lead from petrol exhausts has low bioavailability. Proper studies in these areas urgently need to be carried out.

There are many other sources of lead in our environment, such as lead water pipes, lead solder used in canned foods, lead paint, etc. From his research,

environmental health consultant Dr Alan Bell says we should be looking at trying to get rid of flaking lead paint in old houses. He says studies have shown this to be a major source of lead in blood.5 It does seem strange to me to replace a brain toxin that falls to the ground straight after coming out of the exhaust, with a gas that is released into our atmosphere and is well known as a highly toxic carcinogen.

I've received three letters telling me that the National Society for Clean Air in the UK has not withdrawn support for ULP. An extract from the society's letter to members states: "NSCA members may have seen an article in *The Sunday Times* of 12/12/93, claiming that the society has 'withdrawn its approval' for unleaded petrol because of concern about benzene emissions. This is untrue; the article quoted selectively from a long briefing given to the journalist in question and seriously misrepresented the society's position."6

Next is a letter I thought was worth reprinting, as it offers another perspective on some parts of our previous articles and suggests some interesting alternatives.

I read with interest the above article compiled by Catherine Simons. *[See ULP Pt 1, vol. 2#25.]*

It is not correct to say that early cars ran on exceptionally clean fuel; the quality was variable to say the least... The emissions of early cars were anything but clean, as the combustion process was a very hit-and-miss affair...

An engine cannot and never could produce only carbon dioxide and water vapour as the exhaust gas components; this works only in theory when complete combustion (or oxidation) takes place. There are a number of reasons for this which include:
(1) the speed of the engine limiting the time available to burn the fuel;
(2) the type and design of the combustion chamber;
(3) the valve timing of the engine;
(4) fuel retention around the piston ring lands;
(5) fuel separation in the inlet manifold.

Power increases in motor vehicle engines were brought about not so much by increased compression ratios, but by the bore-to-stroke ratio. A short-stroke engine would be faster than a long-stroke. In this country [England] we suffered the setback of the Treasury rating for engines which, by the nature of the formula used, made the short-stroke engine prohibitively expensive to use from an owner's point of view, and consequently the only alternative was the long-stroke-good for torque output, but poor for high-speed running. Bugatti used to tease Bentley about his "racing lorries"...

Nitrogen, of which there is about 79% in the atmosphere, was never a problem, as, being inert, it was unaffected by combustion. Only when combustion temperatures reach figures of 2,500°C and above is the nitrogen oxidised, and it then produces four oxides which, in combination with hydrocarbons in the presence of sunlight, produces a smog. The worst of these oxides is nitrogen dioxide, which is a reddish-brown gas, an irritant, a supposed carcinogen, and which causes respiratory inflammation.

The catalytic converter was the worst possible answer to the problem of emissions. The solution was obvious-at least to British engineers: the way forward was by lean-burn technology. Not for the first time we led the rest of the world in this field, but a political decision opted for the use of converters.

From a logical point of view, using two very precious metals as catalysts is a crazy idea: platinum is obvious; less obvious is rhodium, until you realise that 99% of all rhodium mined comes from South Africa. If, at any future time, problems arose whereby it would not be possible to trade with South Africa, then the consequences would be obvious.

Having watched America at work with catalytic converters for a number of years, it was obvious even to the meanest intelligence-including bureaucrats-that the system was not an effective remedy; so, naturally, the thing to do was then adopt the American (Californian) system in total and apply it to Europe, taking care to ignore the fact that the conditions in the two locations were completely different, and therefore the figures were meaningless.

Catalytic converters take time to warm up, and until they do so they are every bit as 'dirty' as a vehicle without one. In fact, the 'bad egg' smell which emanates from the exhaust is hydrogen sulphide, a gas which is thought by some experts to be highly carcinogenic.

Unfortunately big money/business is involved, and this almost always clouds the facts and the truth. For some inexplicable reason, vested interests always seem to be mutually exclusive to the truth.

With lead in fuel, although it was by no means ideal, at least we knew where it was going. Now, with the emission gases being lighter, they may well be collecting but at a higher point off the ground, and it may be years before we see what the results of this will be.
The picture is not entirely gloomy, however; there are very positive aspects to all of this, and to the way forward in the short, medium and long term.The informed thinking for the future is:
1. Lean-burn technology.
2. A lean-burn catalyst. This is very different to the present idea, in that it seeks to remove oxygen from an oxygen-rich environment, so that the nitrogen will

once again emerge from the exhaust pipe as nitrogen-but without the oxides.
3. The use of specialised upper-cylinder lubricants. These are already available, and everyday motorists can add these to a tank of fuel, safe in the knowledge that they can do something to improve the air quality and reduce the pollutants emitted from their exhausts.

Other options are also available to use a fuel with a reduced carbon content. One possibility in this field is methane, which has only one carbon atom (compared to octane, for example, which has eight). This will have the immediate effect of reducing carbon dioxide.

The idea of the battery car, when examined for a moment, is really a non-starter (no pun intended!). Although, when it is running, it is indeed almost pollution-free, the power consumed to make the batteries is considerable. The power-to-weight factor is as yet unacceptable, the fuel consumed at the power station to recharge the batteries is high, and, lastly, lead-acid batteries are difficult to dispose of when their useful life is over.

One idea which I am actively working on is steam. It has every possible advantage (and none of the disadvantages mentioned above): maximum power and torque at standstill, recycled exhaust, therefore zero emissions (if there were any emissions they would be only water vapour). The engine would only need to be a three-cylinder two-stroke, equivalent to a six-cylinder four-stroke: very few moving parts ensures reliability and performance. The heat source: a hydrogen catalyst, providing motive power within 10 seconds of starting.

The problem with this design? Apathy/animosity from the 'vested interests'. There is no doubt that this design will not meet with their approval as it is contrary to their thinking at this time. It requires people with vision and commitment to back this idea in order that it may work...

Yours faithfully,
Douglas Wragg, I.Eng., L.A.E., M.I.M.I., M.I.R.T.E., F.Diag.E.,
Road Transport Consultant Engineer, Balcombe,
Sussex, England, UK.

Footnotes:

1. Professor Bill McCarthy, Melanoma Unit, Royal Prince Alfred Hospital, "Submission to the Senate Select Committee on Aircraft Noise in Sydney", 8 May 1995
2. Dr Alan Bell, *Public Health Bulletin*, March 1995; S. Corbett and C. Cowie, *Public Health Bulletin*, November 1993.
3. Telephone conversation between C. Simons and Peter Anyon, Director, Regulation Policy and Projects, Federal Office of Road Safety, Canberra, ACT, Australia, July 1995.

4. Simon Grose, *The Canberra Times*, 26 March 1994.
5. Telepho ne conversation between C. Simons and Dr Alan Bell, Environmental Health Consultant, Mosman, Sydney, Australia, July 1995.
6. National Society for Clean Air (UK), Briefing to Members, 1994.General reference: Telephone conversation between C. Simons and Brian Wells, Australian Automobile Association, July 1995.

"Since the end of '92, beginning '93, we are constantly having increased haemoglobin [Hb] levels in many of our patients. Where the level used to be 13 or 13.5, we now have 16, sometimes 17 and more. Please check the measuring methods."

Mrs Rau, a medical technologist in my laboratory, responded, however, that all values had been checked but that the Hb levels have constantly risen since about March 1993, namely in steadily rising increments over a period of several months. I had this phenomenon of the steady increase in haemoglobin levels checked again in our independent hospital laboratory, with the same results. This Hb-level increase was mainly observed in patients who were not seriously sick and, thus, whose bone marrow was capable of regulation in a normal manner. Then Nurse Monika told me: "The leucocyte count also increased last year on average." This observation, too, proved to be correct.

Hundreds of patients which I was able to check again in '93 to compare the levels with previous years, showed this phenomenon of a rather drastic Hb increase. Some of my colleagues noted similar observations. On the occasion of a lecture at Langenhagen, where I talked about this increase of Hb levels, laymen also reported that they had been informed by their physicians in this respect. Such increases of Hb levels are, to a broad extent, typical for an oxygen deficiency; for example, in persons who constantly live at high altitudes. This is a normal adaptation of the blood formation to oxygen deficiency. Actually, the Hb-level increase in many controlled patients is very much associated with a decrease of P02 in the blood, thus with a reduction of the oxygen partial pressure in blood, even if this reduction is only slight.

Which factor is responsible for this impediment to oxygen absorption? Practically, only the abovementioned toxic gases from cat. cars come into consideration-no alternative is in sight.

In fact, this phenomenon does not occur in inhabitants of the North Sea islands (where the wind blows from the seaside). Furthermore, we did not observe this phenomenon in rechecked patients from large agricultural regions in midwestern US; however, we did find it in patients living in the east and north-west of the US and, in 1993, in persons living in California.

Why weren't we able to observe this phenomenon to such a noticeable degree in 1991 or in 1992? Well, 1993 was a very humid year, the previous years had very dry weather. Phosphoric esters (nerve gas), minor traces of which are capable, like enols, of restricting the oxygen absorption of cells, are likely to adhere to tiny drops of water and thus are readily absorbed by the biosystem. In times of dryness, these substances degrade faster and are scarcely inhaled. In '93, it was raining almost all the time in Germany, and in California there were steaming and heavy cyclical showers. An increased susceptibility to infections and irritations of the bronchial passages was observed in all patients.

This was not a particularly pleasant observation, but another serious discovery was added in the fall of '93. For about 18 years, clinical oncologists have noticed that patients having cancer, a predisposition for cancer, osteoporosis or an illness of the immunological system such as multiple sclerosis, very often showed rather low urea levels in the blood serum, while the creatinine levels did not show this drop so clearly. Then, in 1987, Amat, the Spanish biochemist and neurologist, issued a l,000-page monograph on the biochemical importance of urea. This study only exists in Spanish, but it is, however, indispensable for every oncologist and immunologist.

Amat was able to show that urea in the blood serum is not only a substance that is present as a catabolite of the protein metabolism for output through the kidneys, but that urea in the blood creates a large pool with automatic control functions of fundamental importance. Ureal metabolism has a regulative function for at least seven further metabolitic pools, or vice versa. Amat described this system as being a communicative machinery which includes the pyruvate and glutamate cycles, as well as elements of the lipido metabolism.

Experience has taught us that the urea level in blood serum should be approx. 37 mg%. [In the US, BUN ranges from 10 to 25 -*TLfD* Ed.] If it rises much higher, there can be kidney damage. This is a known fact. If the level, however, is lower, the organism is at great risk in the long run. The frequency of cancer increases. At levels of less than approx. 17 mg%, multiple tumours have occurred quite often. This connection is very probable in cases of predisposition for melanomatosis in patients normally having a clean skin. Very often, there is a correlation between multiple sclerosis, osteoporosis, as well as illness of the immunological system and very low urea levels. Over the last 15 years, we have attempted to explore the phenomenon of low urea levels. However, this is quite impossible without having read Amat's 'fat volume'. Obviously, the cellular biologic structure has been linked to urea for millions of years as an indispensable factor for the stability of membrane and gene structures. Or, the functions of the abovementioned metabolic machinery have to be adjusted so that a 'complete' urea pool would be the result. If this is not the case, for whatever reason, the cell membranes and the gene systems tend to show instability. And this has serious consequences for keeping an

organism healthy.

We have observed in many patients whose haemoglobin levels increased in 1993 that they had reduced urea levels also. This was particularly the case in patients who had relatively low levels and low blood pressure previously. Also, the triglyceride levels seem to decrease. It seems as if the abovementioned toxic substances produced by the catalytic converter have led not only to latent, very slowly developing damage to the 'Amat machinery' but also to a reduction of the urea pool. If this is the case-and I have virtually no doubts in this respect-this would be an extremely threatening development.

One more thing which we noticed was that in patients with ALS (amyotrophic lateral sclerosis) we also found low urea levels. ALS, contrary to multiple sclerosis, is not a disease of the immunological system. In cases of ALS, you find a defect of the capability to inactivate viruses of the measles group and, in particular, the cellular incapacity of zymogenesis, called SOD (super-oxide-dismutase). This SOD, however, is necessary in order to prevent toxic oxidative radicals and heavy metals from damaging nerve cells. We are positive on one point: the many ALS patients observed by us frequently come from regions with cat. cars. The situation is becoming worse. However, the connection between the cat. car and ALS will have to be examined in longer term studies.

Being a well-known critic of the catalytic converter, I am frequently asked what I would recommend, in particular with respect to the threatening aspects described herein. First of all, all catalytic converters should be removed from cars as soon as possible. A parallel measure should be the removal of MTBE and, to the extent possible, of benzene, too, from gasoline. As a next step, gasoline should be slightly leaded again, but just to the necessary extent. 'Intrinsic' combustion in gasoline engines should be optimised as suggested as a preferential solution, by Peugeot and Citroen President Jacques Calvet in three letters he sent me. One way to achieve this is to lead the fuel or the gas mixture through magnetic fields. Another good procedure would be the use of high-energy ignitions of mainly non-ohmic power quality (so-called plasma ignition based on the Tesla phenomenon). These procedures allow a lean-mixture [lean-burn] operation, reducing the toxic burden from the exhaust.

The fact that ADAC [German automobile club], *Stern* [a German news magazine] and other organs have been discrediting this technique over the years in a most nasty manner, speaks for itself. ADAC has been aware of the problems related to the catalytic converter for more than eight years. The manner in which this problem has acquired criminal relevance, in view of latest knowledge, will have to be judged by the competent institutions.

I further recommend buying nothing but a diesel, when the purchase of a new

car is being considered. German, French and Swedish companies offer diesel cars with excellent quality which, in principle, are superior to gasoline-operated cars anyway.

However, these recommendations only have a limited perspective. Many readers might not know that the end of gasoline-and diesel fuel-has been introduced as of 1st January 1998, namely by a Californian law. Two per cent of all cars sold under one brand must be exhaust-free; if not, this brand must refrain from selling cars entirely. Only three years later, this regulation will become more strict. There will be no recognition of the brand all over the world if there are no sales in the US.

As battery-operated vehicles will remain insignificant due to physics principles, only a driving mechanism with combustion water, a preliminary stage of oxyhydrogen gas, will come into consideration. It will be generated by converted vacuum-field energy in the car using only water, maybe with a low addition of gasoline, diesel or hydrogen. There is no alternative to this concept except, at best, the so-called Shoulders conversion (Toyota project).

I am very often asked the question of how to protect oneself against the cat. danger in the air. Theoretically, coenzyme Q10 (hydroquinone) should help a bit. However, we did not notice any positive effects with it. Better would be a mixture of potassium-magnesium aspartate together with a urea solution (phone +49 (511) 34 1387). This improves the supply of high-energy phosphates in cellular metabolism. I highly recommend taking vitamin Mi (colaminphosphate salts, Ca-RMg-AEP) in the form of grains in capsules. Tablets with a thick coating are not as easily absorbed by patients with membrane damage. Under this treatment with about three to five capsules a day, oxygen absorption through the lungs into the blood is improved. Nevertheless, there is no alternative: catalytic converter poison must be removed from the air, and quickly!

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